NIOSH Extramural Award Final Report Summary

Title:	Hazard Surveillance in the Defense Nuclear Industry
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Award Number:	5 RO1 CC 912034-03
Start & End Date:	9/30/1995-9/29/1999
Total Project Cost:	$1,191,563
Program Area:	NORA
Key Words:	

Abstract:
The overall goal of this research is to develop an integrated theory, approach, and methodology to exposure assessment and hazard surveillance, which emphasizes characterization of exposure to complex mixtures of chemical toxicants and biomechanical problems as well as single agents. The research has relevance to identification and characterization of problems associated with decommissioning and decontamination of Department of Energy sites, application to the defense nuclear industry and other high-risk industrial locations. This research represents collaboration between the University of California at Los Angeles and Berkeley, Lawrence Livermore and Los Alamos National Laboratories. The specific aims of the overall research can be subdivided into subsections.

1. Exposure assessment and hazard surveillance: To identify appropriate statistical tools for characterizing multiple chemical agents; to explore toxicologic and epidemiologic implications of multivariate exposure characterization; to measure task-specific exposures with real time instrumentation and integrated sampling; to develop models of exposure based on task specific data; to test these models with integrated sampling, and to refine the models based on the results.
2. Modeling pollutant concentration between source and worker: Improve our understanding of small scale (0 to 2 m) dispersion of contaminants with the ultimate goal of predicting personal exposure based on the minimum number of area concentration measurements. To provide a tool for efficient screening of a large number of work sites for potential inhalation hazards.
3. Application of biologic monitoring and biomarkers of exposure for exposure assessment and hazard surveillance: To make use of biologic monitoring, biomarkers of exposure, and toxicokinetic modeling to better estimate internal and target tissue dose from exposure to single and multiple chemical agents and evaluated interactive effects associated with toxicokinetic interaction.
4. Integrated task and postural analysis for ergonomic exposure analysis: To develop, pilot test, and validated an integrated task and postural analysis for ergonomics exposure assessment.

5. Evaluation of current exposure and medical surveillance programs at Los Alamos and Lawrence Livermore National Laboratories: To evaluated the medical and exposure surveillance programs at LANL, identify discrepancies between health and safety "needs" and established monitoring programs, and develop an integrated surveillance system that efficiently combines hazardous-exposure, biological, and health-outcome monitoring of the worker population.
6. Assessing risks from exposure to multiple physical and chemical agents: To develop and implement a risk based framework and methodology that permits estimation of the incidence of adverse health impact predicted from environmental/biological exposure and enables development of surveillance programs and intervention strategies to prevent adverse consequences of exposures.

Publications

Chen WG, McKone TE: Chronic Health Risks from Aggregate Exposures to Ionizing Radiation and Chemicals: Scientific Basis for an Assessment Framework. Risk Analysis, 21, pp 25-42, 2001

Wu JD, Milton DK, Hammond SK, Spear RC: Hierarchical Cluster Analysis Applied to Workers' Exposures in Fiberglass Insulation Manufacturing. Ann. Occup. Hyg., 43, pp 43-55, 1999